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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,823	12/19/2005	Joergen Hansen	14455.880US01	5908
43430 7590 11/05/2009 BERENBAUM WEINSHIENK PC 370 17TH STREET SUITE 4800 DENVER, CO 80202				
EXAMINER JOLKE, MICHELE K				
ART UNIT		PAPER NUMBER		
1636				
NOTIFICATION DATE		DELIVERY MODE		
11/05/2009		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/561,823

**Applicant(s)**

HANSEN ET AL.

**Examiner**

MICHELE K. JOIKE

**Art Unit**

1636

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 4-21 is/are pending in the application.
- 4a) Of the above claim(s) 5,6,17,18 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,7-16,19 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB008)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

Receipt is acknowledged of a reply to the previous Office Action, filed August 5, 2009. Claims 1, 2 and 4-21 are pending; claims 1-2, 4, 7-16, 19 and 21 are under consideration in the instant application. Any rejection of record in the previous Office Action, mailed October 28, 2008 that is not addressed in this action has been withdrawn.

Because this Office Action only maintains rejections set forth in the previous Office Action and/or sets forth new rejections that are necessitated by amendment, this Office Action is made FINAL.

### ***Election/Restrictions***

This application contains claims drawn to an invention nonelected with traverse in the reply filed on July 8, 2008. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### ***Claim Objections***

Claims 9-13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 is limited to the aglycon, vanillin. Claims 9-13 broaden the aglycon that can be used.

Claims 14-16 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 1 and 4. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). Claim 1 is already limited to yeast and vanillin. Claim 4 limits the yeast species.

Claim 7 is objected to because of the following informalities: It has the wrong status identifier. Claim 7 was examined in the last office action. It has not been withdrawn. Appropriate correction is required.

The new 35 U.S.C. 103(a) rejection recited below has been necessitated by amendment.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 4, 7-16, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moehs et al, Day et al, Arend et al and Priefert et al.

Moehs et al (The Plant J. 11(2): 227-236, 1997, especially pp. 227-229, 233, 234 and Figure 7) teach a method of producing a low molecular weight aglycon. cDNA encoding solanidine glucosyltransferase (SGT) from potato, which is a UDPG-glucosyltransferase is used. Solanidine is an aglycon that is in the family of nitrogenous secondary metabolites. Both the SGT and solanidine genes were introduced into *S. cerevisiae*. The cell was allowed to ferment grow and produce the SGT, which then added glucose residues to solanidine as shown in figure 1. The aglycon has a MW of 397.64 (as evidenced by [www.rdchemicals.com](http://www.rdchemicals.com)). Figure 7 shows that solanidine was recovered. It also shows that the cell is capable of producing higher amounts of glycosylated solanidine with SGT present, than without. However, Moehs et al does not teach deglycosylating the aglycon, or that the aglycon is vanillin.

Day et al (IDS ref. 6, especially abstract, figure 1, table 1, and page 74) teach deglycosylating the aglycon, flavenoid, by  $\beta$ -glucosidase. It also teaches that the deglycosylation occurs in a cell-free extract. Therefore, deglycosylation occurs outside the cell. However, they do not teach that the aglycon is vanillin.

Priefert et al (Applied Microbiol. Biotechnol 56:296-314, 2001, especially p. 296) teach production of the aglycon, vanillin.

Arend et al (Biotechnol Bioeng. 76(2):126-31, 2001, especially pp. 129-130) teach that at least some glycosyltransferases are capable of glycosylating a number of different structurally related secondary metabolites and other structurally related low molecular weight organic compounds. Specifically, they teach cloning of a glucosyltransferase from the plant *Rauvolfia serpentina*. The cloned glucosyltransferase was inserted into *E. coli* bacteria. When the aglucones hydroquinone, vanillin and p-hydroxyacetophenone were added to the medium of cultivated cells of the engineered *E. coli*, the corresponding glucosides, arbutin, vanillin-D-glucoside and picein were synthesized. They also were released from the cells into the surrounding medium.

The ordinary skilled artisan would have been motivated to combine the teachings of Moehs et al teaching a method of producing solanidine, with the teachings of Day et al teaching deglycosylating an aglycon, with the teaching of Priefert et al, teaching the production of vanillin, with the teachings of Arend et al because Day et al state that deglycosylation via  $\beta$ -glucosidase is an important step in metabolism, and that deglycosylation is important for uptake, excretion and biological activity. It would have been obvious to one of ordinary skill in the art to use vanillin because Priefert et al state that vanillin is one of the most important aromatic flavor compounds used in foods, beverages, perfumes, and pharmaceuticals, and is produced on a scale of more than 10 thousand tons per year by the industry through chemical synthesis. Given the teachings of the prior art and the level of the ordinary skilled artisan at the time of the applicant's invention, it must be considered, absent evidence to the contrary, that said

skilled artisan would have had a reasonable expectation of success in practicing the claimed invention.

***Response to Arguments Concerning Claim Rejections – 35 USC § 103 (a)***

Applicant's arguments filed August 5, 2009 have been fully considered but they are not persuasive.

The following grounds of traversal are presented:

The present application provides technical information on how to introduce the complete biosynthesis pathway of vanillin into a yeast microorganism and thereby perform the method of claim1. One skilled in the art would have no reason to believe that the general concept of overproducing the glycosylated product would work in substantially all microorganism and with substantially all relevant aglycon compounds, and specifically, glycosylating and then deglycosylating the aglycon. One skilled in the art would have seen knowledge from the plant kingdom as virtually useless information with respect to how things would work in microorganisms, because plants are highly complex. The present development offers the possibility of producing vanillin in a much cheaper way. Moehs teaches yeast for merely as use for an expression library, and not biosynthesis of an aglycon. Day and Priefert do not remedy the deficiencies of Moehs failure to teach overproduction of an aglycon.

Applicant's arguments have not been found persuasive for the following reasons.

Applicants are not claiming how to introduce the complete biosynthesis pathway of vanillin into a yeast microorganism. They are teaching production of an aglycon. Moehs et al teach glycosylating an aglycon in yeast. Day et al teach deglycosylating an aglycon, which is a useful process and an important step in metabolism. Glycosylation occurs in yeast; deglycosylation occurs in a cell-free extract. One of skill in the art would not need the knowledge from the process performed in plants. Glycosylating solanidine in yeast is taught by Moehs et al. It does not matter if Moehs et al had a different motivation for using yeast, they teach using yeast to glycosylate an aglycon. Therefore, there is reason to believe that glycosylating other aglycons will be successful. Also, Moehs shows that the cell is capable of producing higher amounts of glycosylated solanidine with SGT present, than without, therefore, overproduction of an aglycon is taught. While producing vanillin in a cheaper way is a benefit for applicants, it does exclude the prior art, since the combined references teach the invention, therefore also teach producing vanillin in a cheaper way. Lastly, as discussed above, there are no deficiencies for Day or Priefert to cure.

***Allowable Subject Matter***

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP



§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELE K. JOIKE whose telephone number is (571)272-5915. The examiner can normally be reached on M-F, 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Low can be reached on (571)272-0951. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michele K. Joike/  
Examiner, Art Unit 1636

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